

REMARKS

Applicants submit that the foregoing amendments and the following remarks render the instant method patentable over the art of record.

Applicants affirm their July 21, 2005 election to prosecution claims 1-7. Please cancel claims 8-20 without prejudice.

Claim 4 is rejected under 35 U.S.C. §112 as non-enabling. Claims 1-2 and 4-5 are rejected under 35 U.S.C. §102(b) as being anticipated by Brown et al. Claims 3 and 6-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Brown et al.

Claim 1 is amended to recite a NaF weight percent of no more than 2%. Support for this added limitation is found on page 9 line 7 of the specification.

Claim 2 is amended to recite a KF to AlF_3 mole ratio of from 1.0 to 1.5. Support for this added limitation is found on page 7, lines 28-29 of the specification.

Claim 3 is amended to recite alumina solubilities of between 4 and 6 percent. Support for this limitation is found on page 8, lines 1-4 of the specification.

Applicant's Invention

The invention claims a NaF-limited electrolyte based on KF and AlF_3 . This enables high solubility of alumina and efficient electrolysis. The invented electrolyte enables electrolysis procedures at low temperatures. In contrast, the art of record discloses a NaF-rich electrolyte and in fact *teaches away* from an electrolyte lacking in NaF.

Concentration of electrolyte components remain relatively constant

Claim 4 is rejected under 35 U.S.C. §112 as being non-enabling for maintaining a constant concentration of the electrolyte components. Pursuant to the Examiner's observations, claim 4 has been amended to recite that electrolyte constituents remains relatively constant during the electrolysis process.

As stated in the specification, the concentrations of these constituents remain *relatively* constant because the electrolyte operates at a relatively low vapor pressure (less than 10 millibar)

in the process range temperature of between 660° Celsius and 1000° Celsius. (Page 4, lines 2-6). The composition of vapor escaping from the melt is very near the composition of the melt itself. Therefore, the composition of electrolyte does not change significantly.

In light of the amendment to claim 4, Applicants submit that the 35 U.S.C. §112 rejection is no longer applicable.

Brown teaches away from a KF to AlF₃
molar ratio of greater than 1.0

Claims 1-2, and 4-5 are rejected under 35 U.S.C. §102(b) as being anticipated by Brown et al. Applicants submit that in light of the amendments to claim 1, the §102(b) rejection is now obviated.

Amended claim 1 recites the relative concentrations of the electrolyte constituents to reflect an electrolyte deficient in NaF. This contrasts with a salient feature in Brown wherein NaF is considered a vital constituent of its electrolyte. For example Brown states the following in Column 6, lines 17-21:

“One eutectic or near-eutectic composition consists essentially of 42-46 mole % AlF₃ ...and 54-58 mol % of either (a) *all NaF* or (b) *primarily NaF* with equivalent mol amounts of either KF, LiF or KF plus LiF replacing some of the NaF. (Emphasis mine).

As more fully discussed in the accompanying 1.132 Affidavit, the Brown specification (Column 14, lines 29-38) states that aluminum current efficiency during electrolysis is relatively inadequate (i.e., 33%) when using electrolyte lacking in NaF, and when using electrolyte containing KF. This current efficiency is the lowest of any of Brown's experiments and far below any value considered adequate (see affidavit).

A salient element of a prima facie anticipation rejection requires that the reference must *teach*. As such, Brown should not be considered prior art. A prior art reference “may yet be held not to legally anticipate the claimed subject matter if it is found not to be sufficiently enabling, in other words, if it does not place the subject matter of the claims within the possession of the public.” In Re Wilder 429 F. 2d 447, 166 USPQ 545 (C.C.P.A. 1964).

In contrast to Brown, now amended claim 1 limits NaF to no more than 2 wt %. This is supported by the specification on page 9, line 7 wherein the applicant states "small additions of NaF (> 2 wt%) are detrimental to cell operations." As stated in the specification, the addition of sodium fluoride significantly decreases alumina solubility in the electrolyte, and causes partial solidification of the electrolyte, reducing cell performance. Although raising the system temperature can alleviate the solidification issue, higher temperatures decrease the durability of system components, which is why relatively low operating temperatures (e.g., the 660-1000 °C operating temperatures recited in claim 5) are enabled by the invented electrolyte. Moreover, alumina solubility does not improve significantly with increasing temperature, which is why, and as further discussed in the affidavit, Brown relies on a "slurry cell" design. However, this viscous slurry is at least partially responsible for lower current efficiencies seen in Brown.

The invented electrolyte's molar ratio of potassium fluoride (KF) to aluminum fluoride (AlF₃) is recited in amended claim 2 (wherein the molar ratio of potassium fluoride to aluminum fluoride ranges from about 1.0 to 1.5).

The invented electrolyte's ability to induce increased alumina solubility is recited in now amended claim 3 (alumina solubility of between 4-6%). This increased solubility is at least double the solubility cited in Brown (Col 3, lin 57).

In light of the foregoing amendments to claim 1, Applicants request withdrawal of the §102 rejection and allowance of claims 1-2, and 4-5.

Claims 3 and 6-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Brown et al. The Applicants submit that in light of the amendments to claim 1 and claim 3, the 103(a) rejection is now obviated.

In summary, the Na-F poor electrolyte composition as now claimed is neither anticipated nor suggested by Brown. Withdrawal of the 103 rejection and allowance of claims 3 and 6-7 is respectfully solicited.

An earnest attempt has been made hereby to respond to the July 28, 2005 Official Action in the above-identified matter. The Applicants submit that claims 1-7 are in condition for

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allowance. If the Examiner feels that a telephone conversation will expedite allowance of the application, he is respectfully urged to contact the undersigned. Allowance of the pending claims is hereby solicited.

Respectfully submitted

CHERSKOV & FLAYNIK

By

A handwritten signature in black ink, appearing to read "Michael J. Cherskov", written over a horizontal line.

Michael J. Cherskov (Reg. No. 33,664)